Drug compliance among hypertensive patients in Kassala, Eastern Sudan

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امتثال مرضى ضغط الدم المرتفع في كسلا بجنوب السودان، للأدوية المقرَّرة لهم

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خلاصة: أجريت دراسة مقطعية على مرضى ضغط الدم المرتفع وتم تقدير مدى امتثالهم لتناول الأدوية المقرَّرة لهم. كما تم تقدير العوامل المصاحبة لهذا الامتثال، ولدى ضبط ضغط الدم، ولحدوث المضاعفات. وتبيَّن أن نسبة الامتثال لنظام تناول الأدوية كانت 59.6 % مقيسة بطريقة عدّ الأقراص. كما وجد أن 92 % من المرضى الممتثلين كان لديهم ضغط دم منضبط بالمقارنة بنسبة 18 % من المرضى غير الممتثلين. وأن 30.1 % من المرضى الممتثلين حدثت بهم مضاعفات بالمقارنة بنسبة 46.3 % من غير الممتثلين. وبينما كان معدل الامتثال لنظام تناول الأدوية في مستوى معقول، فإن 36.8% من المرضى لم يكونوا ممتثلين نظراً لأنه لم يكن باستطاعتهم شراء مضادات الضغط المرتفع. لقد كان العجز عن شراء الأدوية مرتبطاً على نحو سلبي بمعدل الامتثال بدرجة يعتد بها إحصائياً. وكان هؤلاء المرضى يعانون عدم انضباط ضغط الدم وغير ذلك من المضاعفات.

ABSTRACT A cross-sectional study of hypertensive patients was conducted and drug compliance was estimated. Factors associated with compliance, status of blood pressure control and occurrence of complications were assessed. Compliance was 59.6% as measured with the pill count method. We found 92% of compliant patients had controlled blood pressure in comparison with 18% of non-compliant patients, and 30.1% of the compliant patients had complications in comparison with 46.3% of the non-compliant patients. While the compliance rate was reasonable, 36.8% of patients were non-compliant because they could not afford to buy antihypertensive drugs. Inability to buy drugs was negatively and significantly associated with compliance. These patients experienced uncontrolled blood pressure and other complications.

L'observance médicamenteuse chez des hypertendus à Kassala dans la partie est du Soudan

RESUME Une étude transversale de patients hypertendus a été réalisée et l'observance médicamenteuse évaluée. Les facteurs associés à l'observance, au niveau de contrôle de la tension artérielle et à la survenue de complications ont été évalués. L'observance était de 59,6%, mesurée par la méthode du décompte des comprimés. On a trouvé que 92% des patients observants avait une tension artérielle contrôlée contre 18% des patients non observants, et 30,1% des patients observants avaient des complications contre 46,3% de patients non observants. Bien que le taux d'observance soit raisonnable, 36,8% des patients n'adhéraient pas au traitement médicamenteux parce qu'ils n'avaient pas les moyens d'acheter les antihypertenseurs. L'incapacité d'acheter les médicaments était associée de manière significative et négative à l'observance. Ces patients avait une tension artérielle non contrôlée ainsi que d'autres complications.

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Introduction

Hypertension is one of the most common disorders in the world. Its prevalence in Sudan was estimated at 7.5% by an earlier study [*1*]. Long-term trials have repeatedly shown that the use of antihypertensive drugs reduces both morbidity and mortality resulting from hypertension [*2*], and non-compliance results in the reduction of benefits provided by those drugs [*3*]. Another consequence of non-compliance is the unnecessary prescribing of different drug types [*4*], which in turn leads to an unnecessary escalation of the cost of the health care [*5*]. The silent nature of hypertension often encourages the tendency of patients to be non-compliant [*6*], although factors such as the nature of the treatment regimen, side-effects of the drugs, sociodemographic factors and factors related to the patient's milieu are also involved [*7*]. Our study aimed to estimate compliance with drugs use among hypertensive patients, associated factors and the effect of compliance on blood pressure control.

Subjects and methods

A cross-sectional study was conducted during 1997 in the town of Kassala, Sudan. The town has a population of 300 000. The study involved 198 hypertensive patients who were registered at and consecutively attended the Department of Medicine, Kassala Teaching Hospital.

Data were collected using a structured questionnaire. Data collected included information about the patient's age, sex and education and information regarding aspects of hypertension treatment, such as disease duration, duration of treatment, number of drugs taken for hypertension (1, 2 or > 2 drugs), drug regimen (once, twice or more than twice per day), and the source of drugs (free or not). Patients were also asked whether the same or different doctors saw them at follow-up and whether they had been taking their drugs regularly or not and for what reasons.

Blood pressure (BP) was measured using a mercury sphygmomanometer. Patients were seated for at least 5 minutes and BP was measured with the patient lying on a couch. A cuff of suitable size was applied evenly and firmly around the right exposed upper arm. The cuff was rapidly inflated until the reading was 30 mmHg above the level at which the pulse disappeared, then slowly deflated at a rate of 2 mmHg per second. Systolic blood pressure (SBP) was taken at Phase I of Kortokoff's sound disappearance. Diastolic blood pressure (DBP) was taken at Phase V [*8*]. Patients who had SBP of ≤ 140 mmHg and/or a DBP of ≤ 90 mmHg were considered to have controlled BP [*8*].

The presence or absence of complications was documented by the presence of symptoms of cardiovascular, neurological or renal complications, by the presence of signs of affected target organs, by testing the urine for albumen and by performing an electrocardiograph for all patients in the study. Each procedure was performed in accordance with World Health Organization criteria [*8*]. A positive sign in any of these areas was considered indicative of the presence of a complication.

Each patient was prescribed a 3-week supply of antihypertensive pills and was requested to return the remaining pill container after 2 weeks. Patients were not told why they were given that particular number of pills. The number of pills of antihypertensive medication prescribed and those not used were counted and recorded each

time at two visits, 2 weeks apart. The compliance rate was calculated as:

$$\text{Compliance rate} = \frac{\text{No. pills prescribed} - \text{No. pills missed}}{\text{No. pills prescribed in the same period}} \times 100\%$$

The average compliance rate for the two visits was calculated and patients whose compliance rate was 80% or more were considered as compliant [9].

Data were analysed using *SPSS*. The χ^2 test was used to test the significance of the differences between the categories. Variables associated with non compliance were tested using multiple logistic regression analysis where non-compliance was considered as a dependent variable and age, sex, education, number of drugs, frequency of drugs, means of obtaining drugs, regularity in drug taking and reasons for not taking drugs regularly as independent variables. *P*-values of ≤ 0.05 were considered statistically significant.

Results

The study involved 198 hypertensive patients, the majority of whom (76.3%) were female. The overall mean age ± standard deviation was 53.03 ± 11.2 years and was 56.1 ± 11.1 years and 52.0 ± 11.1 years for males and females respectively. About two-thirds of the patients (61.6%) had some education; the rest were illiterate.

In all, 55.1% of the patients had had the condition for more than 5 years and 54.0% had received treatment for that period. Slightly more than 60% of the patients had controlled blood pressure. The frequency of complications among all the patients was 36.9%, while that among controlled and uncontrolled patients was 27.9% and 51.3% respectively (Table 1).

Table 2 gives information on drug treatment and compliance. The majority of the

Table 1 **Hypertension among 198 hypertensive patients**

Aspect of disease	No.	%
Duration of hypertension (years)		
< 5	89	44.9
≥ 5	109	55.1
Duration of treatment (years)		
< 5	91	41.6
≥ 5	107	54.0
Blood pressure		
Controlled	122	61.6
Uncontrolled	76	38.4
Complications		
Overall	73	36.9
Among controlled patients	34	27.9
Among uncontrolled patients	39	51.3

$\chi^2 = 11.06$, $P < 0.001$

Table 2 **Aspects of antihypertensive drug treatment**

Aspects of treatment	No.	%
Number of drugs		
One	160	80.0
Two or more	38	19.2
Frequency of drugs		
Once per day	124	62.6
Twice or more per day	74	37.4
Means of obtaining drugs		
Free	22	11.1
Purchased	176	88.9
Regularity of drug intake		
Regular	100	50.5
Not regular	98	49.5
Reason for irregular drugs use		
Absence of disease symptoms	32	32.7
Side-effects of drugs	16	16.3
Lack of belief in drugs	15	15.3
Inability to buy drugs	37	37.8

Table 3 **Compliance with drugs, and its relation with blood pressure control and frequency of complications**

Variable	No.	%	*P*-value, χ^2
Compliance			
Compliant	118	59.6	
Not compliant	80	40.4	
Blood pressure control			
Compliant and controlled	108	91.5	
Not compliant and controlled	14	17.5	< 0.0001, 107.36
Presence of complications			
Compliant	36	30.5	
Not compliant	37	46.3	< 0.02, 5.08

patients (80.8%) had been treated with one antihypertensive drug and were taking one per day. The majority of the patients (88.9%) had to pay for their drugs. When the patients were asked about their regularity in taking the drugs, half claimed that they were regular, and 36.8% of those who were not regular stated that they were unable to buy the drugs. Approximately 30% did not regularly take their drugs because they did not suffer from symptoms of hypertension. The remainder were not regular because of the presence of side-effects from the drugs or because of a lack of belief in drugs.

The total number of patients who were compliant with treatment was 118 (59.6%). Among compliant patients there were significantly more patients with controlled BP and significantly fewer patients with complications of hypertension (Table 3).

Using multiple logistic regression analysis, the only variable that was positively and significantly associated with non-compliance was that of being unable to buy drugs ($P < 0.001$) (Table 4).

Table 4 **Logistic regression analysis of inability to buy drugs with non-compliance**

Variable	Intercept (*B*)	Exp (*B*)	SE	Significance
Inability to buy drugs	2.0942	0.1232	0.6578	0.001
Constant	3.5822	0.9766	0.0001	

SE = standard error

Discussion

The patients involved in this study were middle-aged to elderly hypertensive men and women who had had the disease for several years. Slightly more than half of them had controlled hypertension, a typical demonstration of the "rule of halves" [*10*]. The majority of the patients were being treated with a single antihypertensive drug taken once per day. This is desirable because compliance is usually associated with monotherapy [*11*]. The majority of the patients had to buy their medications.

Our results revealed that as many as half of the patients were not regular with their medications. Of those who were not regular (49.5%), about 40% said that the reason for the irregularity was the inability to afford the drugs. This is a high proportion.

One-third of the patients had complications of hypertension, a result which is similar to an earlier study in Sudan [*12*]. Our study also found that the rate of complications was higher among patients with uncontrolled hypertension.

Two methods of assessing compliance were used: self-reporting and pill counting. Self-reporting is subjective, and while the

pill count method appears to be more objective and is more commonly used, it tends to overestimate compliance [*13*]. With the pill-count method, we found a compliance rate of approximately 60%. This was higher than that shown by another regional study [*14*]. We also found that the compliance rate was associated with better control of hypertension and with a lower rate of complications. This is in agreement with a similar study in Saudi Arabia [*14*].

Compliance with treatment was negatively related to inability to buy drugs, which is unfortunate. Although health services in Sudan were once offered free of charge, this has changed in the current decade. In this country, which has been classified as one of the poorest 25 countries in the world, people have to pay for health care. Even essential drugs, such antihypertensive medications, must be bought by the patients. This situation has been reported previously [*15*]. Furthermore, there has been an escalation in drug prices in Sudan. The price of a 1-month course of nifedipine, for example, has risen from 231.8 Sudanese pounds in 1990 to 14 000 Sudanese pounds in 1997, with little increase or perhaps even a deterioration in income among a high proportion of Sudanese people (US$ 1 = 2588 Sudanese pounds). This is similar to the situation of inner-city hypertensive, minority populations in the industrialized world [*16*].

Patients in these circumstances will die or become disabled with hypertensive complications if they cannot afford to obtain antihypertensive drugs. Most strategies that are aimed at improvement of compliance in other parts of the world assume that non-compliant patients are able to buy their medications or that they receive them free of charge [*17*]. We found that the main reason for non-compliance, among reasonably compliant patients, was not taken into account in those strategies. Hence we support the recommendations made by Bagir-Ahmed [*15*]. The world health agencies, especially those oriented to the global situation of hypertension, should combine efforts to make medications available to the poor hypertensive patients of Sudan and the rest of the developing world. Otherwise, these patients will suffer unnecessarily or die prematurely because they cannot afford to buy their medications.

Conclusions

The compliance rate with medications was reasonable, but a considerable proportion of patients were non-compliant because they could not afford to buy antihypertensive drugs. These patients had uncontrolled blood pressure and more hypertensive complications.

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